CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS

The U.S. Nuclear Regulatory Commission is issuing this Certificate of Compliance pursuant to Title 10 of the *Code of Federal Regulations*, Part 72, "Licensing Requirements for Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste" (10 CFR Part 72). This certificate is issued in accordance with 10 CFR 72.238, certifying that the storage design and contents described below meet the applicable safety standards set forth in 10 CFR Part 72, Subpart L, and on the basis of the Final Safety Analysis Report (FSAR) of the cask design. This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, and the conditions specified below.

Certificate No.	Effective Date	Expiration Date	Docket No.	Amendment No.	Amendment Effective Date	Package Identification No.
1014	05/31/2000	05/31/2020	72-1014	1	7/15/02	USA/72-1014
	Renewed Effective Date	Renewed Expiration Date		Revision No.	Revision Effective Date	
	08/02/2023	05/31/2060		0	N/A	

Issued To: (Name/Address)

Holtec International
Holtec Technology Campus
One Holtec Blvd.
Camden, NJ 08104

Safety Analysis Report Title

Holtec International Inc.
Final Safety Analysis Report for the
HI-STORM 100 Cask System

CONDITIONS

This certificate is conditioned upon fulfilling the requirements of 10 CFR Part 72, as applicable, the attached Appendix A (Technical Specifications) and Appendix B – (Approved Contents and Design Features), and the conditions specified below:

1. CASK

a. Model No.: HI-STORM 100 Cask System

The HI-STORM 100 Cask System (the cask) consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM 100 or 100S), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC), which contains the MPC during loading, unloading and transfer operations. The cask stores up to 32 pressurized water reactor (PWR), fuel assemblies or 68 boiling water reactor (BWR) fuel assemblies.

b. Description

The HI-STORM 100 Cask System is certified as described in the Final Safety Analysis Report (FSAR) and in the U. S. Nuclear Regulatory Commission's (NRC) Safety Evaluation Report (SER) accompanying the Certificate of Compliance. The cask comprises three discrete components: the MPCs, the HI-TRAC transfer cask, and the HI-STORM 100 or 100S storage overpack.

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. It is made entirely of stainless steel except for the neutron absorbers and optional aluminum heat conduction elements. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. The honeycombed basket, which is equipped with Boral neutron absorbers, provides criticality control.

1. b. Description (continued)

There are seven types of MPCs: the MPC-24, MPC-24E, MPC-24EF, MPC-32, MPC-68, MPC-68F, and MPC-68FF. The MPC-24 and MPC-32 hold up to 24 and 32 PWR fuel assemblies, respectively, that must be intact. The MPC-24E holds up to 24 PWR fuel assemblies, up to four of which may be classified as damaged fuel assemblies (i.e., with known or suspected cladding defects greater than hairline cracks or pinholes). The MPC-24EF holds up to 24 PWR fuel assemblies, up to four of which may be classified as damaged fuel assemblies or in the form of fuel debris (i.e., with known or suspected defects such as ruptured fuel rods, severed fuel rods, and loose fuel pellets). The MPC-68 holds up to 68 BWR fuel assemblies that may be intact or damaged. The number of damaged fuel assemblies is limited to sixteen unless they are Dresden Unit 1 or Humboldt Bay fuel assemblies. The MPC-68F holds up to 68 Dresden Unit 1 or Humboldt Bay BWR fuel assemblies that may be intact or damaged. Up to four Dresden Unit 1 or Humboldt Bay fuel assemblies in the MPC-68F may be in the form of fuel debris. The MPC-68FF holds up to 68 BWR fuel assemblies, up to sixteen of which may be classified as damaged fuel or fuel debris. A maximum of eight fuel assemblies may be in the form of fuel debris. All fuel to be stored in the HI-STORM 100 System must comply with the limits specified in Appendix B to this CoC. All seven MPC models have the same external dimensions.

The HI-TRAC transfer cask provides shielding and structural protection of the MPC during loading, unloading, and movement of the MPC from the spent fuel pool to the storage overpack. The transfer cask is a multi-walled (carbon steel/lead/carbon steel) cylindrical vessel with a water jacket attached to the exterior. Two types of HI-TRAC transfer casks are available: the 125 ton-HI-TRAC and the 100 ton HI-TRAC. The weight designation is the maximum weight of a loaded transfer cask during any loading, unloading or transfer operation. Both transfer cask types have identical cavity diameters. The 125 ton HI-TRAC transfer cask has thicker lead and water shielding and larger outer dimensions than the 100 ton HI-TRAC transfer cask.

The HI-STORM 100 or 100S storage overpack provides shielding and structural protection of the MPC during storage. The HI-STORM 100S is a shortened version of the 100 with a modified lid design incorporating the air outlet ducts into the lid. The overpack is a heavy-walled steel and concrete, cylindrical vessel. Its side wall consists of plain (un-reinforced) concrete that is enclosed between inner and outer carbon steel shells. The overpack has four air inlets at the bottom and four air outlets at the top to allow air to circulate naturally through the cavity to cool the MPC inside. The inner shell has channels attached to its interior surface to guide the MPC during insertion and removal, provide a flexible medium to absorb impact loads, and allow cooling air to circulate through the overpack. A loaded MPC is stored within the HI-STORM 100 or 100S storage overpack in a vertical orientation. The HI-STORM 100A is a variant of the HI-STORM 100 family and is outfitted with an extended baseplate and gussets to enable the overpack to be anchored to the concrete storage pad in high seismic applications. The HI-STORM 100A applies to both the standard (HI-STORM 100) and short (HI-STORM 100S) overpacks that are classified as the HI-STORM 100A and HI-STORM 100SA, respectively.

2. OPERATING PROCEDURES

Written operating procedures shall be prepared for cask handling, loading, movement, surveillance, and maintenance. The user's site-specific written operating procedures shall be consistent with the technical basis described in Chapter 8 of the FSAR.

3. ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

Written cask acceptance tests and maintenance program shall be prepared consistent with the technical basis described in Chapter 9 of the FSAR.

4. QUALITY ASSURANCE

Activities in the areas of design, purchase, fabrication, assembly, inspection, testing, operation, maintenance, repair, modification of structures, systems and components, and decommissioning that are important to safety shall be conducted in accordance with a Commission-approved quality assurance program which satisfies the applicable requirements of 10 CFR Part 72, Subpart G, and which is established, maintained, and executed with regard to the cask system.

5. HEAVY LOADS REQUIREMENTS

Each lift of an MPC, a HI-TRAC transfer cask, or a HI-STORM 100 or 100S overpack must be made in accordance to the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant-specific safety review (under 10 CFR 50.59 or 10 CFR 72.48, if applicable) is required to show operational compliance with existing plant specific heavy loads requirements. Lifting operations outside of structures governed by 10 CFR Part 50 must be in accordance with Section 5.5 of Appendix A and/or Sections 3.4.6 and Section 3.5 of Appendix B to this certificate, as applicable.

6. APPROVED CONTENTS

Contents of the HI-STORM 100 Cask System must meet the fuel specifications given in Appendix B to this certificate.

7. DESIGN FEATURES

Features or characteristics for the site, cask, or ancillary equipment must be in accordance with Appendix B to this certificate.

CHANGES TO THE CERTIFICATE OF COMPLIANCE

The holder of this certificate who desires to make changes to the certificate, which includes Appendix A (Technical Specifications) and Appendix B (Approved Contents and Design Features), shall submit an application for amendment of the certificate.

9. SPECIAL REQUIREMENTS FOR FIRST SYSTEMS IN PLACE ||

The heat transfer characteristics of the cask system (for each unique MPC basket design: MPC-24, MPC-24E, MPC-24EF, MPC-32, MPC-68, MPC-68F and MPC-68FF) will be recorded by temperature measurements for the first HI-STORM Cask Systems placed into service, by any user, with a heat load equal to or greater than 10 kW. An analysis shall be performed that demonstrates the temperature measurements validate the analytic methods and predicted thermal behavior described in Chapter 4 of the FSAR.

Validation tests shall be performed for each subsequent cask system that has a heat load that exceeds a previously validated heat load by more than 2 kW (e.g., if the initial test was conducted at 10 kW, then no additional testing is needed until the heat load exceeds 12 kW). No additional testing is required for a system after it has been tested at a heat load equal to or greater than 16 kW.

Letter reports summarizing the results of each validation test shall be submitted to the NRC in accordance with 10 CFR 72.4. Cask users may satisfy these requirements by referencing validation test reports submitted to the NRC by other cask users.

10. PRE-OPERATIONAL TESTING AND TRAINING EXERCISE ||

A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM 100 Cask System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the MPC. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to the following:

a. Moving the MPC and the transfer cask into the spent fuel pool.

b. Preparation of the HI-STORM 100 Cask System for fuel loading.

c. Selection and verification of specific fuel assemblies to ensure type conformance.

d. Loading specific assemblies and placing assemblies into the MPC (using a dummy fuel assembly), including appropriate independent verification.

e. Remote installation of the MPC lid and removal of the MPC and transfer cask from the spent fuel pool.

f. MPC welding, NDE inspections, hydrostatic testing, draining, moisture removal (by vacuum drying or forced helium dehydration, as applicable), helium backfilling, and leakage testing. (A mockup may be used for this dry-run exercise.)

g. Transfer cask upending/downending on the horizontal transfer trailer or other transfer device, as applicable to the site's cask handling arrangement.

h. Transfer of the MPC from the transfer cask to the overpack.

i. Placement of the HI-STORM 100 Cask System at the ISFSI.

j. HI-STORM 100 Cask System unloading, including cooling fuel assemblies, flooding MPC cavity, removing MPC lid welds. (A mockup may be used for this dry-run exercise.)

11. FSAR UPDATE FOR RENEWED CoC

The CoC holder shall submit an updated FSAR to the Commission, in accordance with 10 CFR 72.4, within 90 days after the effective date of the renewal. The updated FSAR shall reflect the changes resulting from the review and approval of the renewal of the CoC, including the HI-STORM 100 FSAR supplement, as documented in Appendix D of the HI-STORM 100 CoC renewal application, Revision 1, dated April 23, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21113A203). The CoC holder shall continue to update the FSAR pursuant to the requirements of 10 CFR 72.248.

12. 10 CFR 72.212 EVALUATIONS FOR CoC USE DURING THE PERIOD OF EXTENDED OPERATION

Any general licensee that initiates spent fuel dry storage operations with the HI-STORM 100 Cask System after the effective date of the renewal of the CoC and any general licensee operating a HI-STORM 100 Cask System as of the effective date of the renewal of the CoC, including those that put additional storage systems into service after that date, shall:

a. As part of the evaluations required by 10 CFR 72.212(b)(5), include the evaluations related to the terms, conditions, and specifications of this CoC amendment as modified (i.e., changed or added) as a result of the renewal of the CoC.

b. As part of the document review required by 10 CFR 72.212(b)(6), include a review of the FSAR changes resulting from the renewal of the CoC and the NRC Safety Evaluation Report related to the renewal of the CoC.

c. Ensure that the evaluations required by 10 CFR 72.212(b)(7) and determinations required by 10 CFR 72.212(b)(8) capture the evaluations and review described in (a.) and (b.) of this CoC condition.

d. Complete this condition prior to entering the period of extended operation or no later than 365 days after the effective date of the renewal of the CoC, whichever is later.

13. AMENDMENTS AND REVISIONS FOR RENEWED CoC

All future amendments and revisions to this CoC shall include evaluations of the impacts to aging management activities (i.e., time-limited aging analyses and aging management programs) to ensure they remain adequate for any changes to structures, systems, and components within the scope of renewal.

14. AUTHORIZATION

The HI-STORM 100 Cask System, which is authorized by this certificate, is hereby approved for use under the general license issued pursuant to 10 CFR 72.210, subject to the conditions specified by 10 CFR 72.212, and the attached Appendix A and Appendix B. All HI-STORM 100 Cask Systems must be fabricated and used in accordance with CoC No. 1014, Amendment No. 1; except that general licensees may use the HI-STORM 100 Cask Systems that were fabricated in accordance with the original CoC.

FOR THE U. S. NUCLEAR REGULATORY COMMISSION

Yoira K. Diaz-Sanabria Digitally signed by Yoira K. Diaz-Sanabria
Date: 2023.06.29 08:08:35 -04'00'

Yoira K. Diaz-Sanabria, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Dated: June 29, 2023

Attachments:
1. Appendix A
2. Appendix B